Examiner in the Office Action dated January 20, 2000, Applicants believe that it would be helpful to provide a brief description of some of the factors that demonstrate the novelty and non-obviousness of the compositions recited in the presently pending claims.

- Claims 1 to 25 recite the transitional phrase "consisting essentially of". Therefore, the compositions disclosed in the prior art references that contain components that would materially affect the basic and novel characteristics of the claimed invention are outside the scope of those claims.

- Claims 26 to 29 recite the transitional phrase "comprising", but are directed to preferred embodiments of the present invention, where the oxidizer composition comprises a mixture or a comelt of silver nitrate and at least one other component. Applicants are not aware of any prior art low temperature autoignition composition that comprises an intimate mixture of a metal fuel and such an oxidizer. Therefore, those claims are believed to be patentable.

- The claims rejected in the Office Action dated January 20, 2000, recite low temperature autoignition compositions in which an oxidizer and a metal fuel are sufficiently intimately mixed to provide the degree of contact between the oxidizer and the metal fuel required to provide the presently claimed autoignition temperature. In contrast, the prior art references teach composite propellants and gas generators in which the metal and oxidizer are dispersed within a binder matrix, thus, preventing intimate mixing of the metal and oxidizer.

- The present claims recite low temperature autoignition compositions that contain a metal fuel in an amount at least sufficient to provide a substantially stoichiometric mixture of a metal fuel and oxidizer, which, along with the intimate mixing of the oxidizer and metal fuel, provides the presently claimed autoignition temperature. The prior art references do not teach or even suggest that a metal fuel should be intimately mixed with the oxidizer and present in an amount at least sufficient to provide a substantially stoichiometric mixture of metal fuel and oxidizer.

In addition, the preamble to the present claims, i.e., "A low temperature autoignition composition for safely initiating combustion of a main pyrotechnic charge in a gas generator or pyrotechnic device exposed to flame or a high temperature environment", under the law, must be considered as a limitation in the definition of the invention recited in the present claims. Section 2111.02 of the M.P.E.P. states that the preamble of a claim limits a claim when it is "essential to point out the

igniting the gas generator composition in an inflator in a vehicle fire. It was the Applicants' discovery of the presently claimed invention that provided a solution to the problem of providing a stable low temperature autoignition composition, a problem that the cited prior art references do not even address, let alone solve. Therefore, the preamble to the present claims gives life, meaning, and vitality to the present claims, and is thus a limitation on the claims that must be considered in determining the patentability of the present claims. As a result, any reference that does not disclose, teach, or suggest a low temperature autoignition composition is outside the scope of the present claims, and cannot provide any motivation to obtain the presently claimed low temperature autoignition compositions.

Applicants thus submit that the cited references do not teach or suggest the presently claimed invention, for these reasons and for those set forth below in more detail, and, thus, the present claims are not obvious. Further, in support of the arguments made herein, Applicants also submit herewith a Declaration under 37 C.F.R. §1.32 of Christopher P. Ludwig, a named inventor, which evidence those features by which the presently claimed invention is distinguished from the cited prior art references.

Claims 1, 13 to 18, and 26 to 29 are rejected under 35 U.S.C. § 103 as being allegedly unpatentable over Sammons et al. ("Sammons") in view of Sidebottom, Garner '253, Healy, and Ellern et al. ("Ellern") for the reasons set forth on page 2 of the Office Action.

In response, Applicants submit that the presently claimed invention is directed to a low temperature autoignition composition for safely initiating combustion of a main pyrotechnic charge in a gas generator or pyrotechnic device exposed to flame or a high temperature environment. Claim 1 recites that, in one embodiment, the autoignition composition consists essentially of an intimate mixture of an oxidizer composition and a powdered metal fuel, where the oxidizer composition comprises silver nitrate or a comelt or mixture comprising silver nitrate and at least one additional component selected from the group consisting of an alkali metal nitrate, an alkaline earth metal nitrate, a complex salt nitrate, a dried, hydrated nitrate, an alkali metal chlorate, an alkali metal perchlorate, an alkaline earth metal chlorate, an alkaline earth metal perchlorate, ammonium perchlorate, sodium nitrite, potassium nitrite, silver nitrite, a complex salt nitrite, a solid organic nitrate, and a

solid organic nitrite, and the metal fuel is selected from the group consisting of molybdenum, calcium, strontium, barium, titanium, zirconium, vanadium, niobium, tantalum, chromium, tungsten, manganese, iron, cobalt, nickel, copper, zinc, cadmium, tin, antimony, bismuth, aluminum, silicon, and mixtures thereof. The oxidizer composition has at least one of a crystalline phase transition, a melting point, a eutectic point, or peritectic point at a temperature of no more than about 250°C. The metal fuel is present in an amount at least sufficient to provide a substantially stoichiometric mixture of metal fuel and oxidizer, and the metal fuel and oxidizer are sufficiently intimately mixed to ensure a sufficient degree of contact in the composition between the oxidizer and the metal fuel to provide an autoignition composition having an autoignition temperature of no more than about 232°C.

As recited in claim 26, in an alternate embodiment, the low temperature autoignition composition comprises a mixture of an oxidizer composition and a powdered metal fuel, wherein the oxidizer composition comprises a mixture or a comelt comprising silver nitrate and at least one additional component selected from the group recited in claim 1. Again, the metal fuel is present in an amount at least sufficient to provide a substantially stoichiometric mixture of metal fuel and oxidizer, and the metal fuel and oxidizer are sufficiently intimately mixed to ensure a sufficient degree of contact in the composition between the oxidizer and the metal fuel to provide an autoignition composition having an autoignition temperature of no more than about 232°C. Useful metal fuels include, but are not limited to molybdenum, magnesium, calcium, strontium, barium, titanium, zirconium, vanadium, niobium, tantalum, chromium, tungsten, manganese, iron, cobalt, nickel, copper, zinc, cadmium, tin, antimony, bismuth, aluminum, and silicon.

As discussed in the attached Declaration of Christopher P. Ludwig, the intimate mixing of the fuel and oxidizer is required in the present invention to provide the contact between the oxidizer and the metal fuel that is necessary to obtain proper autoignition. In particular, the Declaration states at paragraph 5, "The intimate mixing of the fuel and oxidizer is required in the present invention to provide the contact between the oxidizer and the metal fuel that is necessary to obtain proper autoignition, as the reaction or burning rate and ease of autoignition of the compositions of the invention increase as mix intimacy and homogeneity increases."

In contrast, Sammons discloses composite propellants, comprising an

oxidizer and a metal fuel dispersed within a binder matrix. Column 1, lines 17 to 30 and 69 to 71, column 2, lines 1 to 4, column 5, lines 53 to 66, column 6, lines 13 to 44, and the examples. The binder is based upon a linear polymethylenenitramine that is polymerized after being mixed with the fuel and oxidizer. Column 2, line 1, to column 4, line 14, and the examples. Therefore, Sammons does not disclose or suggest a low temperature autoignition composition consisting essentially of an intimate mixture of an oxidizer composition comprising silver nitrate or a comelt or mixture comprising silver nitrate and at least one of the other oxidizers recited in the claims and a powdered metal fuel, as recited in the claims. Instead, as discussed in paragraph 7 of the attached Rule 132 Declaration, the dispersion disclosed by Sammons prevents the intimate mixture of oxidizer and fuel. This lack of intimate mixing due to the presence of the binder materially affects the mixing of the oxidizer and the fuel in the compositions disclosed by Sammons, thus reducing the contact between the oxidizer and the fuel required to obtain the presently claimed autoignition temperature range of from about 80° to about 232°C. Therefore, Sammons does not teach or suggest the presently claimed invention.

Moreover, the only oxidizer disclosed by Sammons is ammonium perchlorate, which decomposes at about 380°C, a temperature that is significantly higher than the presently claimed 250°C. This further distinguishes the composite propellants disclosed by Sammons from the low temperature autoignition materials of the invention.

The other cited references do nothing to overcome the deficiencies of Sammons. In particular, none of the other cited references teach or even suggest an intimate mixture of an oxidizer composition and a metal fuel. Therefore, even if the teachings of the secondary references were combined with those of Sammons, the combination would not provide an intimate mixture of an oxidizer composition and a metal fuel as required by the claims to the low temperature autoignition composition of the invention.

Sidebottom teaches gas generating compositions comprising an alkali or alkaline earth metal azide, an oxidizing compound, and an oxide of silicon, aluminum, titanium, tin, or zinc with or without silicon, aluminum, titanium, tin, or zinc metal. Column 1, lines 44 to 49. Examples include a composition containing sodium azide, silicon, and potassium perchlorate in molar proportions of 8:4:3 and a

composition containing sodium azide, aluminum, and potassium chlorate in molar proportions of 2:2:1. Column 3, lines 61 and 62, column 4, lines 45 and 46. Therefore, as with compositions comprising a binder, the azide separates the particles of oxidizer and metal, and prevents the formation of an intimate mixture of an oxidizer composition and a powdered metal fuel. Sidebottom thus does not disclose or suggest the presently claimed intimate mixture of a metal fuel and oxidizer, where the oxidizer composition comprises silver nitrate or a comelt or mixture comprising silver nitrate and at least one of the other oxidizers recited in the claims, whether taken alone or in combination with Sammons.

Moreover, the only oxidizers disclosed by Sidebottom are potassium perchlorate and potassium chlorate, which have melting points of 400°C and 368°C, respectively. These melting points are significantly higher than those required in the presently claimed invention.

Garner '253 teaches the use of starch as a fuel/binder in pyrotechnic compositions, such as those used as gas generants in inflatable safety restraints. Garner does not teach or suggest an intimate mixture of an oxidizer composition and a metal fuel. Instead, Garner teaches a pyrotechnic composition in which the oxidizer and fuel are separated by a binder, thus, preventing the required intimate mixing.

Healy teaches a melt in fuel emulsion comprising a melt of ammonium nitrate as the discontinuous phase and a fuel as the continuous phase. Column 1, lines 9 and 10. The fuel is a water-insoluble non-self-explosive fuel selected from the group consisting of hydrocarbons, halogenated hydrocarbons, and mixtures thereof. Column 1, line 66, to column 2, line 9. Therefore, as Healy discloses a completely different fuel than that recited in the claims to the present invention, Healy also fails to teach or even suggest the presently claimed intimate mixtures of oxidizers and metal fuels.

As discussed in the attached Rule 132 Declaration in paragraph 9, the Final Office Action also states that Ellern, at pages 296 to 300, teaches, "the melting point and decomposition temperature of silver nitrate, and discusses the reaction of solid fuels with solid oxidizers as related to melting temperature. This would seem to suggest the relatively low decomposition or autoignition (spontaneous ignition) temperature of such compositions." However, the teachings of Ellern must be taken

in context. That is Ellern specifically states, in the sentence bridging pages 296 and 297, that there is a scarcity of systematic data regarding the initiation temperature of fuel-oxidizer mixtures that restricts general statements. Although Ellern teaches that the melting point of silver nitrate is 214°C, in Tables 29 and 30 Ellern only discloses metal/oxidizer binary mixtures and ignition mixtures having initiation temperatures of at least 300°C. Such an autoignition temperature of 300° is, of course, outside the scope of the present claims, and, thus, does nothing to teach or even suggest the presently claimed invention. Moreover, as with the other secondary references, substituting the silver nitrate oxidizer disclosed by Ellern for the oxidizer disclosed by Sammons et al. would not provide the present invention, as it does not provide the intimate mixture of oxidizer and fuel as recited in the claims to the present invention.

As discussed above, even if the teachings of Sammons were combined with the teachings of any of the other cited references, the combination would not provide the presently claimed intimate mixture of an oxidizer composition of silver nitrate or a comelt or mixture comprising silver nitrate and at least one of the other oxidizers recited in the claims and a powdered metal fuel. Instead, the combination would provide a propellant in which the oxidizer and fuel are dispersed throughout a binder matrix, thereby preventing the intimate mixing of the oxidizer and metal fuel. As a result, the cited references provide no motivation to one of ordinary skill in the art to obtain the presently claimed invention.

Therefore, Sammons, Sidebottom, Garner '253, Healy, and Ellern, whether taken alone or in combination do not teach or suggest the presently claimed invention, and fail to provide any motivation to one of ordinary skill in the art to obtain the presently claimed invention. Accordingly, the claims are not obvious over any or all of those references, and it is respectfully requested that the Examiner withdraw the rejection of claims 1 and 13 to 18 under 35 U.S.C. § 103.

Claims 1, 13 to 16 and 25 to 29 were rejected under 35 U.S.C. § 103 as being unpatentable over Halliday et al. ("Halliday") in view of Tepper and Ellern for the reasons set forth on pages 2 and 3 of the Office Action.

In response, as discussed in paragraph 10 of the attached Rule 132 Declaration, Halliday teaches explosive "water-in-fuel" and "melt-in-fuel" emulsions. The disclosed emulsions comprise an oxidizer as the discontinuous phase, a fuel as the continuous phase, and a density reducing agent. Column 1, lines 17 to 33. The

fuel should be substantially solid at ambient temperature, but should also have a softening point above ambient temperature. Column 1, lines 41 to 49. Typical fuels include waxes, oils, liquid paraffin, xylene, toluene, petroleum, and dinitrotoluene. Column 1, lines 57 to 59, and column 3, lines 11 to 18. The softening point of the fuel should be above 35°, so that the fuel has a low viscosity at 85° to 95°C. Column 1, lines 59 to 62. Clearly the fuels disclosed by Halliday are not metals, and are, thus, outside the scope of the present claims.

Although Halliday does teach that a solid fuel, such as atomized aluminum, may be blended together with the density reducing agent, column 1, lines 37 to 40, Halliday fails to teach or suggest the presently claimed intimate mixture of oxidizer composition and metal fuel. As Halliday teaches that the metal is dispersed throughout the continuous phase of the fuel with the density reducing agent, the metal is substantially separated from the oxidizer by the fuel, preventing intimate mixing of the metal fuel and oxidizer, as presently claimed.

Moreover, Halliday teaches that the disclosed explosive emulsions typically comprise 75 to 95 weight percent oxidizer and 3.2 to 6.5 weight percent fuel. Therefore, the amount of metal fuel is significantly less than the amount required to provide a stoichiometric mixture of metal fuel and oxidizer, further distinguishing the presently claimed invention from the explosive emulsions disclosed by Halliday.

Tepper does nothing to overcome the deficiencies of Halliday. Tepper teaches castable pyrotechnic compositions comprising powdered metal dispersed in a low-melting metal nitrate or metal chlorate oxidizer. Column 1, lines 1 to 22. The powdered metal is dispersed in a melt of the oxidizer to form a slurry during the casting process, and, thus, the disclosed castable compositions must have high temperature stability, or they would autoignite during the casting process.

Tepper does not disclose an autoignition composition having an autoignition temperature of no more than about 232°C. The salt mixtures disclosed by Tepper melt below 250°, column 1, lines 56 and 57, and, as it must be assumed that the compositions do not autoignite during the casting process, the disclosed compositions do not have an autoignition temperature of no more than 232°C. Moreover, even if the teachings of Tepper and Halliday were combined, such that

the metal fuels of Tepper were used in the emulsions of Halliday, the combination would not provide the presently claimed invention. Instead, one would obtain an explosive "water-in-fuel" or "melt-in-fuel" emulsion, comprising the discontinuous phase, a fuel as the continuous phase, a density reducing agent, and an optional metal fuel dispersed throughout the continuous phase of the fuel with the density reducing agent, so that the metal is substantially separated from the oxidizer by the fuel, preventing intimate mixing of the fuel and oxidizer, as presently claimed.

In Table 19, as stated in the Office Action, Ellern teaches the melting points and eutectics of various nitrates and mixtures of various nitrates. The melting points and eutectics of the nitrates and mixtures ranges from 52° to 561°C. However, Ellern does not teach or suggest that the nitrates should be intimately mixed with a powdered metal fuel to form a low temperature autoignition composition having an autoignition temperature of no more than about 232°C.

Moreover, if the teaching of Ellern was combined with that of Halliday or Tepper, the combination would not provide the presently claimed invention. Instead, the combination would provide explosive "water-in-fuel" and "melt-in-fuel" emulsions in which the optional metal, if present, was dispersed through the fuel phase, making the intimate mixing of the metal fuel and oxidizer impossible.

Therefore, as Halliday, Tepper, and Ellern, whether taken alone or in combination do not teach or suggest the presently claimed intimate mixture of oxidizer and metal fuel, the present claims are not obvious. Accordingly, it is respectfully requested that the Examiner withdraw the rejection of claims 1 and 13 to 16 under 35 U.S.C. § 103.

For the reasons set forth on pages 3 and 4 of the Office Action, claims 1, 13 to 18, and 25 to 29 were rejected under 35 U.S.C. § 112, first and second paragraphs, as allegedly not describing the invention in such full, clear, concise, and exact terms as to enable one skilled in the art to make and use the invention, and/or for allegedly failing to particularly point out and distinctly claim the subject matter Applicants regard as the invention.

In response, Applicants submit that, for the reasons set forth below, the claims, as amended, are not indefinite, and are fully supported by the specification as originally filed, such that one of ordinary skill in the art would be able to make and use the claimed invention without undue experimentation.

With regard to the scope of the present claims, claim 1, as amended, recites a low temperature autoignition composition consisting essentially of an intimate mixture of (1) an oxidizer composition comprising silver nitrate or a comelt or mixture comprising silver nitrate and at least one additional component selected from the group consisting of an alkali metal nitrate, an alkaline earth metal nitrate, a complex salt nitrate, a dried, hydrated nitrate, an alkali metal chlorate, an alkali metal perchlorate, an alkaline earth metal chlorate, an alkaline earth metal perchlorate, ammonium perchlorate, sodium nitrite, potassium nitrite, silver nitrite, a complex salt nitrite, a solid organic nitrate, and a solid organic nitrite, where the oxidizer composition has at least one of a crystalline phase transition, a melting point, a eutectic point, or peritectic point at a temperature of no more than about 250°C, and (2) a powdered metal fuel, selected from the group consisting of molybdenum, calcium, strontium, barium, titanium, zirconium, vanadium, niobium, tantalum, chromium, tungsten, manganese, iron, cobalt, nickel, copper, zinc, cadmium, tin, antimony, bismuth, aluminum, silicon, and mixtures thereof. The metal fuel is present in an amount at least sufficient to provide a substantially stoichiometric mixture of metal fuel and oxidizer, and the metal fuel and oxidizer are sufficiently intimately mixed to ensure a sufficient degree of contact in the composition between the oxidizer composition and the metal fuel, such that the autoignition composition has an autoignition temperature of no more than about 232°C. Although a wide variety of compositions fall within the scope of the present claims, the claims are not unduly broad and indefinite, and undue experimentation is not required to practice the presently claimed invention.

To practice the invention, one of ordinary skill in the art simply needs to select a silver nitrate based oxidizer composition having a crystalline phase transition, a melting point, a eutectic point, or peritectic point in the desired temperature range, and then write the balanced chemical equation for the reaction of the oxidizer composition and a specific metal fuel. Once the balanced equation is obtained, the stoichiometric amounts of each reactant follow directly from the equation, i.e., the balanced equation provides the mole ratio of oxidizer composition and metal fuel that is required to obtain a stoichiometric mixture. The amount of metal fuel can than be adjusted to obtain the desired autoignition temperature. Specification, page 10, lines 8 to 25.

The specification clearly teaches how to make and use the presently claimed low temperature autoignition compositions. In particular, the specification provides various examples of compositions containing silver nitrate and a powdered metal fuel in amounts that will provide an autoignition material having an autoignition temperature of no more than 232°C, as recited in the claims. In addition, in light of the specification, the claims clearly define the invention, and are fully enabled by the specification, allowing one of ordinary skilled in the art to practice the claimed invention. Following the teaching of the specification, one of ordinary skill in the art is able to obtain low temperature autoignition compositions that utilize the oxidizer compositions and metal fuels that are recited in the claims, but not specifically taught in the examples.

The specification also clearly teaches, at page 9, line 11, to page 11, line 36, that the driving force for the reaction of the oxidizer composition and the metal fuel follows from the electromotive series, i.e., the activity series, for metals. Metallic elements higher in the series will displace metallic elements lower in the series from a solution or melt of a salt of the lower metallic element by means of an oxidation-reduction reaction, i.e., the metallic element in the solution or melt is reduce to its elemental form by the other metal. For example, when copper metal is placed in a silver nitrate solution, the copper displaces the silver from the solution. As a result, particles of silver metal appear on the surface of the copper, and the solution turns blue as copper ions enter the solution.

Therefore, using the electromotive or activity series for metals, one of ordinary skill in the art will clearly understand which oxidizers will work with a given metal fuel and, conversely, which metal fuels will work with a given silver nitrate-based oxidizer composition to provide a low temperature autoignition composition in accordance with the invention without undue experimentation. That is, once a metal fuel or oxidizer composition is selected, a corresponding oxidizer composition or metal fuel that will provide the desired low temperature autoignition composition can be readily determined using the electromotive or activity series.

It will also be clear to one of ordinary skill in the art that autoignition of the presently claimed autoignition compositions will not occur unless conditions are kinetically favorable for the reaction to occur. The required conditions will exist at or slightly lower than the temperature at which the oxidizer composition has at least one

of a crystalline phase transition, a melting point, a eutectic point, or peritectic point. Therefore, the choice of oxidizer composition is, in part, controlled by the temperature at which at least one of a crystalline phase transition, melting point, eutectic point, or peritectic point of the oxidizer composition occurs. These points may be easily obtained from reference texts, such as the Merck Index, or from simple calorimetry experiments, such as Differential Scanning Calorimetry. One of ordinary skill in the art will readily recognize that while silver nitrate may be used alone, oxidizers other than silver nitrate recited in the claims must be utilized in combination with silver nitrate, as presently claimed, in a comelt or mixture to obtain the required crystalline phase transition, melting point, eutectic point, or peritectic point. For example, according to the Merck Index, silver nitrate melts at 212°C, and thus, comelting or mixing silver nitrate with a second oxidizer is not required to obtain a low temperature autoignition composition in accordance with the presently claimed invention. However, potassium perchlorate decomposes at 400°C, and, thus, must be mixed or comelted with at least silver nitrate as a second oxidizer to form a mixture or comelt that has a crystalline phase transition, melting point, eutectic point, or peritectic point of less than about 250°C to obtain the desired low temperature autoignition material. Examples of such mixtures or comelts of oxidizers are provided in the specification. Thus, the specification clearly enables one of ordinary skill in the art to select the oxidizer compositions and metal fuels in the amounts required to obtain the low temperature autoignition compositions of the invention without undue experimentation.

With regard to the solid organic amines that may be incorporated into the autoignition compositions of the invention, Applicants submit that the claims have been amended to clarify that those amines useful in the invention need not be oxidizers. The claims have thus been amended to recite that, in oxidizer compositions that comprise mixtures and comelts, at least one additional component selected from the group consisting of an alkali metal nitrate, an alkaline earth metal nitrate, a complex salt nitrate, a dried, hydrated nitrate, an alkali metal chlorate, an alkali metal perchlorate, an alkaline earth metal chlorate, an alkaline earth metal perchlorate, ammonium perchlorate, sodium nitrite, potassium nitrite, silver nitrite, a complex salt nitrite, a solid organic nitrate, or a solid organic nitrite may be added to the oxidizer composition, i.e., solid organic amines have been deleted from the list of

compounds. However, a solid organic amine may be present to serve some other purpose, i.e., not as an oxidizer, in the low temperature autoignition compositions of the invention, as recited in new claims 30 to 32, as long as the amount of solid organic amine does not interfere with the formation of an intimate mixture of metal fuel and oxidizer composition.

Therefore, the specification teaches the claimed invention in the full, clear, concise, and exact terms required to enable one of skill in the art to make and use the claimed invention, and the claims particularly point out and distinctly claim the subject matter that Applicants regard as the invention. Accordingly, the claims are fully enabled and are not indefinite, and it is respectfully requested that the Examiner withdraw the rejection of claims 1 and 13 to 18 under 35 U.S.C. § 112, first and second paragraphs, and the objection to the specification.

Claims 1, 13 to 16, and 26 to 29 were rejected under 35 U.S.C. §103 as being unpatentable over Poole et al. ("Poole") '380 in view of Ferrando et al. ("Ferrando"), Katzakian et al. ("Katzakian"), Halliday et al. ("Halliday"), and Yabsley et al. ("Yabsley").

In response, as discussed in Mr. Ludwig's Rule 132 Declaration in paragraph 15, Poole discloses ignition compositions for inflator gas generators that comprise HNTO and an oxidizer, where HNTO is the hydrazine (H_2NNH_2) salt of 3-nitro-1,2,4-triazole-5-one, otherwise known as nitrotriazolone ("NTO"). Optionally, the disclosed compositions may also include a metal additive, as a booster ignition material. Poole fails to teach or suggest that the metal additive should be present in an amount at least sufficient to form a stoichiometric mixture of metal and oxidizer, as is required in the present claims. The only composition exemplified by Poole that includes a metal additive contains 78 percent HNTO and 18 percent sodium nitrite, but only 2 percent boron, an amount of boron significantly less than the amount required for a stoichiometric mixture of boron and oxidizer. Therefore, the compositions disclosed by Poole are outside the scope of the presently claimed low temperature autoignition compositions.

The other cited references do nothing to overcome the deficiencies of Poole. Substituting the oxidizers taught in the secondary references for the oxidizer disclosed by Poole would not provide the presently claimed invention, as the

resulting composition would not contain an amount of metal at least sufficient to form a stoichiometric mixture of metal fuel and oxidizer.

A case in point is Yabsley, which discloses oxidizers, such as ammonium nitrate and silver nitrate, for use in melt-in-fuel explosives that comprise a continuous organic fuel phase and a discontinuous oxidizer phase. Column 1, lines 46 to 53. However, using the oxidizers disclosed by Yabsley in the compositions disclosed by Poole would not provide the presently claimed invention. Instead, one of ordinary skill in the art following the teachings of Poole in view of Yabsley would obtain a composition containing HNTO and an oxidizer and, perhaps, an amount of metal significantly less than the amount required for a stoichiometric mixture of metal and oxidizer, as presently claimed.

Ferrando discloses silver coated boron carbide particles for reinforcing certain metal alloy matrices. Column 2, lines 57 to 60, and column 3, lines 1 to 5. The pyrophoric reaction cited in the Office Action is between silver nitrate and boron carbide particles, and occurs during the coating process. However, boron carbide, B_4C, is not a metal, and, thus, Ferrando fails to provide any motivation to one of ordinary skill in the art to use silver nitrate as an oxidizer in the compositions disclosed by Poole. Moreover, even if one of ordinary skill in the art did substitute silver nitrate for the oxidizers disclosed by Poole, it would not provide the presently claimed invention. Instead, it would provide a composition containing HNTO and silver nitrate and, perhaps, an amount of metal significantly less than the amount required for a stoichiometric mixture of metal and oxidizer, as presently claimed.

Katzakian discloses gas generator propellants that contain a polymeric binder blended with an ammonium nitrate based eutectic. Column 1, lines 53 to 67, and the Abstract. However, Katzakian does not teach or suggest an autoignition composition comprising an intimate mixture of a metal fuel and an oxidizer composition. Moreover, even if the teachings of Katzakian and Poole were combined, this combination would not provide the presently claimed invention. Instead, it would provide a composition containing HNTO and ammonium nitrate and, perhaps, an amount of metal significantly less than the amount required for a stoichiometric mixture of metal and oxidizer, as presently claimed.

As previously discussed, Halliday discloses explosive "water-in-fuel" and "melt-in-fuel" emulsions that may contain ammonium nitrate and silver nitrate.

However, as discussed above and in the Rule 132 Declaration, Halliday fails to teach or suggest an autoignition composition comprising an intimate mixture of a metal fuel and an oxidizer composition. Moreover, even if the teachings of Halliday and Poole were combined, the combination would not provide the presently claimed invention. Instead, it would provide a composition containing HNTO and ammonium nitrate and/or silver nitrate and, perhaps, an amount of metal significantly less than the amount required for a stoichiometric mixture of metal and oxidizer, as presently claimed.

Therefore, as Poole, Ferrando, Katzakian, Halliday, and Yabsley, whether taken alone or in combination do not teach or suggest the presently claimed autoignition composition, the present claims are not obvious. Accordingly, it is respectfully requested that the Examiner withdraw the rejection of claims 1, 13 to 16, and 26 to 29 under 35 U.S.C. § 103.

Claims 1, 13 to 15 and 26 to 29 were rejected under 35 U.S.C. § 103 as being unpatentable over Halliday for the reasons set forth on page 5 of the Office Action.

In response, as discussed above and in the Rule 132 Declaration, Applicants submit that Halliday teaches explosive "water-in-fuel" and "melt-in-fuel" emulsions. The disclosed emulsions comprise an oxidizer as the discontinuous phase, a fuel as the continuous phase, and a density reducing agent. Typical fuels include organic materials, such as waxes, oils, liquid paraffin, xylene, toluene, petroleum, and dinitrotoluene. Thus, the fuels disclosed by Halliday are not metals.

Halliday does teach that a solid fuel, such as atomized aluminum, may be blended together with the density reducing agent. However, Halliday fails to teach or suggest the presently claimed intimate mixture of oxidizer composition and metal fuel. As Halliday teaches that the metal is dispersed throughout the continuous phase of the fuel with the density reducing agent, the metal is substantially separated from the oxidizer by the fuel, preventing intimate mixing of a metal fuel and oxidizer, as presently claimed.

Moreover, Halliday teaches that the disclosed explosive emulsions typically comprise 75 to 95 weight percent oxidizer and 3.2 to 6.5 weight percent fuel. Therefore, as will be readily understood by one of ordinary skill in the art, the amount of metal fuel is significantly less than the amount required to provide a

stoichiometric mixture of metal fuel and oxidizer, further distinguishing the presently claimed invention from the explosive emulsions disclosed by Halliday.

Thus, as Halliday, does not teach or suggest the presently claimed intimate mixture of oxidizer and metal fuel, the present claims are not obvious. Accordingly, it is respectfully requested that the Examiner withdraw the rejection of claims 1, 13 to 15 and 26 to 29 under 35 U.S.C. § 103.

Applicants thus submit that the entire application is now in condition for allowance, early notice of which would be appreciated. Should the Examiner not agree with the Applicants' position, then a personal or telephonic interview is respectfully requested to discuss any remaining issues and expedite the eventual allowance of the application.

A separate Fee Sheet for the new claims is filed concurrently herewith. Should any additional fees be found to be due, however, please charge such fees to Graham & James Deposit Account No. 07-1855.

Respectfully submitted,

Date June 22, 2000

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Enclosure

invention defined in the claim." M.P.E.P. § 2111.02, quoting *Kropa v. Robie*, 88 USPQ 478, 481 (CCPA 1951), a copy of which is attached hereto for the convenience of the Examiner. The court in Kropa stated

> On the other hand, in those ex parte and interference cases where the preamble to the claim or count was expressly or by necessary implication given the effect of a limitation, the introductory phrase was deemed essential to point out the invention defined by the claim or count. In the latter class of cases, the preamble was considered necessary to give life, meaning, and vitality to the claims or counts. Usually, in those cases, there inhered in the article specified in the preamble a problem which transcended that before prior artisans and the solution of which was not conceived by or known to them. The nature of the problem characterized the elements comprising the article, and recited in the body of the claim or count following the introductory clause, so as to distinguish the claim or count over the prior art. *Kropa* at 481.

In the present case, the preamble of the claim is essential to point out the invention defined in the claim, and, thus, is a limitation of the claim that must be considered when evaluating the patentability of the claims.

Moreover, the present invention provides a solution to a problem not addressed by the cited prior art references, other than Poole et al, which approaches the problem in a significantly different manner. In the case of, for example, a vehicle fire, an autoignition composition is required to ignite the gas generator composition in a vehicle passive restraint inflator at a temperature that is sufficiently low that the inflator unit maintains mechanical integrity at the autoignition temperature, but which is significantly higher than the temperatures reached under normal vehicle operating conditions. Specification, page 2, line 20, to page 3, line 10. Prior to the present invention, the available autoignition compositions were limited to materials such as nitrocellulose and mixtures of potassium chlorate and a sugar. However, these prior art autoignition compositions often decompose with age, becoming incapable of releasing a sufficient amount of energy to properly ignite the main gas generator charge, and have autoignition temperatures that are too high for some applications, such as non-azide auto air bag main charge generants. Specification, page 3, lines 10 to 19. As a result, the prior art autoignition compositions are not effective for

war message late at night. Upon the entry of his wife, Wilson declares he feels better now that he is no longer indecisive about going to war, and he declares that he is hungry. Mrs. Wilson brings him a pitcher of milk and some crackers. After a few lines of conversation, the President returns to his work. In the motion picture, Wilson is shown in the Oval Room of the White House working late at night on his note to Germany over the Lusitania sinking. His daughter Margaret comes into the room with a tray of sandwiches and a glass of milk, and urges him to get some sleep. The rest of the scene is devoted to showing how much the President misses his first wife, who had just recently died.

That there is some similarity in the two scenes cannot be denied. While in both Wilson is shown working late at night and doing his own typing, plaintiff can hardly claim that these characteristics of the President were not known to many people. The major point of resemblance in the two works is that a member of Wilson's family brings him some milk and simple food. Aside from this, the treatment of the episode is entirely different.

The bare similarities to be found in the von Bernstorff meeting and the "milk and crackers" scene afford no basis for [2] finding an infringement. In both the play and the motion picture these are very small and relatively trivial incidents. It is doubtful whether such incidents per se are protected by the copyright. See Frankel v. Irwin, 34 F.2d 142, 143 (S.D.N.Y. 1918); Eichel v. Marcin, 241 F. 404, 409 (S.D.N.Y. 1913). But even if they are, the proof does not justify a finding that defendant copied any substantial part of the copyrighted matter. Furthermore, these incidents thus far have been treated in isolation from the two works as a whole. After reading the play and the film's script and after seeing the motion picture, it is apparent that the play and the picture are completely dissimilar. The play is concerned almost exclusively with the presentation of public policies and Wilson's attitudes toward the political problems presented. There is little of the President's domestic life. In contrast with this, the motion picture deals as extensively with Wilson's domestic life as with his policies. In addition, the play covers only the period after Wilson became president, while the motion picture presents considerable material covering the years when Wilson was the head of Princeton University and the Governor of New Jersey before he became president.

[3] Considering the great dissimilarity of the two works in relation to the minor resemblances, at best, that are asserted, a comparison of the two does not warrant the conclusion that copying has occurred. The mere possibility of access to the synopsis of the play in defendant's files or to the play itself is not enough to overcome the testimony of the writer, producer and director of the film that they did not see plaintiff's work and did not copy from it. See Twentieth Century-Fox Film Corp. v. Dieckhaus, 153 F.2d 893, 899 [68 USPQ 355, 360-361] (8th Cir. 1946), cert. den. 329 U.S. 716 [71 USPQ 328]. The dissimilarity of the works themselves fortifies the credibility of that testimony, as does the proof of defendant's good faith in obtaining the screen rights to books and plays dealing with Wilson's life and in hiring Dr. Baker as an advisor and in making other extensive preparations to produce this motion picture.

[4] Under the statute, defendant is entitled to counsel fees. A hearing will be had on a date to be agreed upon by counsel to fix the amount of such counsel fees.

I assume that the findings of fact and conclusions of law herein stated are sufficiently specific. If more is desired, specific findings of fact and conclusions of law consistent herewith may be submitted for consideration.

Complaint dismissed on the merits.

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38 C.C.P.A. (Patents) 858

Court of Customs and Patent Appeals

KROPA v. ROBIE AND MAHLMAN

Appl. No. 5725 Decided Feb. 6, 1951

PATENTS

1. Construction of specification and claims — Interference counts — In general

Interference counts are given broadest interpretation which their language reasonably will permit; however, express limitations in counts are not to be disregarded, but must be considered as material.

2. Construction of specification and claims—Introductory phrase

Preambles to claims in cited cases were held not to be limitations where claims were drawn to a structure and

portion of claim following preamble was a self-contained description of structure not depending for completeness upon introductory clause, or where claim was drawn to a product and introductory clause merely recited a property inherent in old composition defined by remaining part of claim; in those cases, claim apart from introductory clause completely defined subject matter, and preamble merely stated a purpose or intended use of subject matter; in other cited cases, where preamble was expressly or by necessary implication given effect of a limitation, introductory phrase was deemed essential to point out invention; in such cases, preamble was considered necessary to give life, meaning, and vitality to claims; usually, there inhered in article specified in preamble a problem transcending that before prior artisans and solution of which was not conceived by or known to them; nature of problem characterized elements comprising article, and recited in body of claim following introductory clause, so as to distinguish claim over prior art.

3. Construction of specification and claims—Introductory phrase

In claims to "An abrasive article comprising * * *," "An abrasive article" is held essential to point out invention defined; words give life and meaning to claims, for it is only by that phrase that it can be known that subject matter defined by claims is comprised as an abrasive article.

4. Words and phrases

Every union of substances capable of use as abrasive grains and a binder is not an "abrasive article," since term calls forth a distinct relationship between proportions of grain and resin comprising article.

5. Construction of specification and claims—Interference counts—Reference to source specification

Meaning of vital term of counts must be taken from application in which counts originated.

6. Specification—Sufficiency of disclosure—In general

Specification states that "reactive resin-reactive solvent combination may be mixed with one or more of the various fillers, e. g., wood flour, paper dust, * * *, granite dust, * * *, carborundum, * * *," this does not inherently disclose an abrasive article; although carborundum and granite dust may be considered as abrasive grains, their enumeration with other substances not capable of use as abrasive grains, together with applicant's characterization of substances as "fillers," is no suggestion that resin be mixed with any of those substances qua abrasive grains; also, mixture of resin with carborundum in proportions commonly understood as appropriate for the addition of a filler would not inevitably yield an abrasive article.

7. Specification—Sufficiency of disclosure—In general

Doctrine of inherency does not mean that a thing might happen once out of 20 times; that disclosure might yield specific article is not enough; it must inevitably happen for doctrine to apply.

Particular patents—Abrasive

2,369,689, Robie and Mahlman, Abrasive Articles and Methods of Manufacturing the Same, awarded priority against Kropa application.

Appeal from Board of Interference Examiners of the Patent Office.

Patent interference No. 82123 between Edward L. Kropa, application filed May 21, 1945, and Norman P. Robie and Osborne L. Mahlman, Patent No. 2,369,689, issued Feb. 20, 1945 on application filed Nov. 6, 1941. From decision awarding priority to Robie and Mahlman, Kropa appeals. Affirmed.

JAMES EDWIN ARCHER, Stamford, Conn., for appellant.

WILLIAM H. WEBB, Pittsburgh, Pa., for appellee.

JOHNSON, Judge.

This is an appeal from an adverse award of priority in a patent interference proceeding in the United States Patent Office between a patentee and a patent applicant, in which the Board of Interference Examiners rendered a decision in favor of the patentee. The interference involves the appellant's application of May 21, 1945, said to be a continuation in part via mesne applications of his Serial Nos. 248,535-6-7 applications filed December 30, 1938, and appellees' patent No. 2,369,689, dated February 20, 1945, which issued on an application filed November 6, 1941.

The subject matter of the interference counts is an abrasive article and a method of manufacturing the article, in which abrasive grains are bonded together by a particular kind of synthetic resin. The counts are claims of the Robie et al. patent and were copied by the appellant in his 1945 application. Of the ten counts in issue, counts 1 and 10 are considered illustrative:

1. An abrasive article comprising abrasive grains and a hardened binder comprising the additive reaction product of a substantially neutral unsaturated monomeric material and an un-

saturated esterification product of an aliphatic alcohol and a polybasic acid.

10. The method of making a dense abrasive article which is substantially free from porosity which comprises commingling an unsaturated polyester, a substantially neutral unsaturated monomeric material reactive with the said polyester and abrasive grains, shaping an article from the mixture thus prepared, and heating the article to solidify the binder to an infusible state by bringing about an additive reaction between the monomeric material and the polyester to cross-link polyester molecules.

As this contest for priority of invention comes before us, each party relies on its filing date as a constructive reduction to practice of the invention defined by the counts. The issue before us turns on whether or not appellant's 1945 application may properly be considered a continuation in part of his 1938 applications. The copendency of appellant's 1945 application with mesne applications in turn copending with his 1938 applications is not disputed. Nor is it disputed that the 1938 applications sufficiently disclosed the resins specified by the counts. What is disputed is that the 1938 applications disclose an abrasive article comprising abrasive grains and a binder of the particular resin or a method of manufacturing the same. Each of the 1938 applications is directed to "resinous compositions and processes of producing" them, an object of each being "to prepare improved resins and especially to obtain clear, colorless gels."

Appellant's 1938 applications do not expressly disclose an "abrasive article." In each of the applications, which are voluminous ones, appears the following statement:

> Alternatively the reactive resin-reactive solvent combination may be mixed with one or more of the various fillers, e.g. wood flour, wood fiber, paper dust, clay, zein, glass wool, mica, granite dust, silk flock, cotton flock, steel wool, carborundum, paper, cloth, sand, white, black or colored pigments, etc.

Appellant contends that the words "abrasive article" or "abrasive products" in the counts should be given no weight. He states that any combination of abrasive grains and binder is inherently an abrasive article, and since the counts contain no limitations whatever as to the proportions of abrasive grains or binder, the counts should be read in the broadest possible manner. So read, urges appellant, they cover any and all combinations of abrasive grains with the binders specified in the counts. Since his 1938 applications disclose the addition of abrasive grains such as "carborundum," sand, and granite dust to the resins specified by the counts, appellant contends, those applications contain an adequate disclosure of the subject matter of the counts.

In ruling on a motion of appellees to shift the burden of proof, based on the contention that the appellant's 1938 applications do not support the counts of the interference, the Primary Examiner ruled in favor of appellant, sustaining contentions similar to those advanced by appellant here. The Board of Interference Examiners, however, after considering the evidence introduced by the parties, differed from the conclusion of the Primary Examiner and held that the appellant's 1938 applications do not explicitly or inherently disclose the subject matter of the counts.

The issues presented for our decision are:

I. Does the phrase "An abrasive article" (and the similar term in the process counts) introduce a limitation into the counts?

II. Is a disclosure of "An abrasive article" and method of making the same inherent in the appellant's 1938 applications?

[1] I. In an interference proceeding the counts are to be given the broadest interpretation which their language reasonably will permit, Malm et al. v. Schneider, 26 C.C.P.A. (Patents) 783, 786, 101 F.2d 201, 40 USPQ 364; Mantz v. Kronmiller, 35 C.C.P.A. (Patents) 1189, 168 F.2d 100, 77 USPQ 628; Osborne v. Patterson et al., 36 C.C.P.A. (Patents) 719, 169 F.2d 817, 79 USPQ 72, however express limitations appearing in counts are not to be disregarded but must be considered as material. Malm et al. v. Schneider, supra; Saklatwalla v. Marburg, 36 C.C.P.A. (Patents) 791, 172 F.2d 227, 80 USPQ 439.

[2] Is the phrase "An abrasive article" a limitation upon what follows in the counts in issue? This court has often had before it the Jepson problem (243 O.G. 525—1917)—whether the preamble to claims in ex parte cases or to the counts in interference cases should be considered as limitations in the claims or counts. Of the thirty-seven cases of this court we have reviewed with respect to this problem it appears that the preamble has been denied the effect of a limitation where the claim or count was drawn to a structure and the portion of the claim following the preamble was a self-contained description of the structure not depending for completeness upon the introductory clause; or where the claim or count was drawn to a product and the introductory clause merely recited a prop-

erty inherent in the old composition defined by the remaining part of the claim. In those cases, the claim or count apart from the introductory clause completely defined the subject matter, and the preamble merely stated a purpose or intended use of that subject matter. On the other hand, in those ex parte and interference cases where the preamble to the claim or count was expressly or by necessary implication given the effect of a limitation, the introductory phrase was deemed essential to point out the invention defined by the claim or count. In the latter class of cases, the preamble was considered necessary to give life, meaning, and vitality to the claims or counts. Usually, in those cases, there inhered in the article specified in the preamble a problem which transcended that before prior artisans and the solution of which was not conceived by or known to them. The nature of the problem characterized the elements comprising the article, and recited in the body of the claim or count following the introductory clause, so as to distinguish the claim or count over the prior art. There is set forth in an appendix to this opinion an analysis of the thirty-seven cases mentioned to which further reference may be made.

[3] In the case before us, the words "An abrasive article" are essential to point out the invention defined by the counts. In our judgment those introductory words give life and meaning to the counts, for it is only by that phrase that it can be known that the subject matter defined by the claims is comprised as an abrasive article. Every union of sub-
[4] stances capable inter alia of use as abrasive grains and a binder is not an "abrasive article." The term calls forth a distinct relationship between the proportions of grain and resin comprising the article. It is important here, as it was in Hall v. Shimadzu, 19 C.C.P.A. (Patents) 1288, 59 F.2d 225, 13 USPQ 259, that the interference counts originated in one party's patent where the entire object of the patent is expressed in the introductory clause of the counts—an objective which nowhere appears in the other party's disclosure (here, appellant's 1938 applications). The term "abrasive
[5] article" is a vital term of the counts, and the meaning must be taken from the application in which the counts originated. Kenyon v. Crane, 28 C.C.P.A. (Patents) 1208, 120 F.2d 380, 49 USPQ 707. We hold that it is a limitation which is material to the issue, and must be observed.

[6] II. The above quoted excerpt from appellant's 1938 applications does not inherently disclose an abrasive article. First, the language of that excerpt expressly refers to the enumerated items as "fillers." Thus, though "carborundum" (silicon carbide), sand, and granite dust under some circumstances may be considered as abrasive grains, their enumeration with various other substances not capable of use as abrasive grains, together with appellant's own characterization of the substances as "fillers" is no suggestion that the resin of his 1938 applications be mixed with any of those substances qua abrasive grains. Ejusdem generis. Secondly, the mixture of the resin with "carborundum," sand, or granite dust in proportions commonly understood as appropriate for the addition of a filler would not inevitably—if at all—yield an abrasive article as that term is understood by the art and indeed contemplated by appellees' patent where the counts originated.

The record fairly establishes that the proportions of silicon carbide, sand, or other substances customarily added to a resinous composition as a filler are distinctly and greatly different than the proportions generally regarded in the abrasive industry as appropriate where "filler" substances, usable as abrasive grains, are mixed as such with a resinous binder to produce an abrasive article. We believe the testimony of the following witnesses preponderates to that effect.

Mr. Boyd H. Work, director of the abrasive engineering department of the Carborundum Company, testified that in commercial practice the relationship between abrasive grain and bond was 70% grain to 30% bond for vitrified bonds, and 80% grain to 20% bond for resinoid bonds. General industry practice does not differ materially from that of the Carborundum Company, he stated, and of Carborundum's 24,000 items of bonded abrasives, none had less than 70% abrasive grain.

Mr. Work testified that fillers are sometimes used in the manufacture of abrasive articles. Silicon carbide, often referred to in the record as "carborundum," is used both as abrasive grains and as a filler. When used as a filler, silicon carbide is used in fine grain sizes, usually finer than 150 mesh. As a filler, its use is for the purpose of changing the action or bonding characteristics of the bond, and not to abrade or increase abrasion. The relative difference between the grain size of the filler and the abrading grains is considerable. Where filler is used in the manufacture of an abrasive article, the relationship between filler, bond, and grain is such that the filler will not exceed 50% *of the bond*, while the proportion of abrasive grain to bond-filler remains as before—not less than 70%. Stock removal by an abrasive article depends, Mr. Work stated, on keeping the

bond percentage down and the abrasive percentage high. Filler substances are only added as fine grits, and these fine grits are included *in* the bond and produce very little cutting action. It is the abrasive grains which protrude beyond the bond to quite a considerable extent which do the cutting—not the grains included in it. Where silicon carbide alone is added in a fine grit or 150 mesh size to the resin, the resulting product might be considered an abrasive article *if* the percentage of grit is in the range where it becomes an abrasive.

Mr. Frederick Upper, manager of manufacturing technical service for the Carborundum Company, testified that in manufacturing abrasive articles where the abrasive grain is silicon carbide or aluminum oxide, that at the finest grit size of either used for abrasive purposes, the percentage of resin required as a bonding medium would be on the average 12 to 15%. He stated that Carborundum Company had never made resin molded abrasives with more than 20% bond. The reason for the small quantity of bond compared to the quantity of abrasive grain, he explained, was that in most grinding wheels minimum bond is desired as it does little or no cutting. If as much as 50% resin and as little as 50% abrasive grain were used, he did not believe a useful abrasive wheel would result.

Mr. Upper testified that fillers are used in the manufacture of some molded abrasives, in which case the article comprised abrasive grains, filler, and bonding medium. The relationship between the percentage of abrasive grains and the percentage of bond plus filler used remained the same, he stated, as in the manufacture of resin bonded molded abrasives without a filler—not less than 80% abrasive grain.

Dr. Edward L. Kropa, the appellant in this case, an employee of his assignee, the American Cyanamid Company, stated that he had no experience in the abrasive industry as such. He testified that he was in charge of the group working on resins and plastics at American Cyanamid. Resins used in most molding compositions, he stated, require the addition of other materials, such as fillers. The type of resin he was dealing with he described as unusual and often the introduction of small amounts of extraneous compounds would affect the cure. Among the compounds tested as fillers were sand and silicon carbide. Dr. Kropa described a filler as a material usually introduced into a molding compound in order to extend the plastic composition. He stated that it was conceivable that one could extend a material with sand or something of that nature, "but it would be for some secondary purpose rather than a cutting action." After stating that a filler to his way of thinking "is a term which at least by secondary chemical forces of some kind, reacts with the resin binder itself," he said that materials not combining chemically with the resin could be used, but as extenders rather than fillers. When counsel quoted and showed Dr. Kropa the excerpt from one of his 1938 applications, which we quoted in introductory portion of this opinion, stating that the resin defined by the counts "may be mixed with one or more of the various fillers," enumerating various substances including "carborundum," and sand, Dr. Kropa after some interrogation stated that his definition (specifying a chemical combination with the resin as a characteristic of a filler) was of an "ideal" filler, whereas he "was using 'filler' in the common definition in the specification."

Dr. Kropa would not agree with a definition of filler as given in the Handbook of Plastics by Simonds and Ellis, published by D. Van Nostrand Co. in 1943, to the effect that a filler is "An inert material which may be added to a resin or other binder for cheapening or for modifying mechanical properties, or to serve as a base for color effects," but then stated that "If you acknowledge a chemical reaction, it then becomes a part of the binder," adding "If there isn't a chemical combination, then it must be a filler." He admitted that fillers are frequently used to extend the resin, and specified that where fillers are used for such a purpose, the proportion of filler to resin is "Usually in about equal weights." When asked if the percentage of filler is not frequently less than 40 per cent, he replied that "frequently it can be for certain specific uses," adding, however, that "It is usually around equal weights." He testified that "carborundum" was one of the fillers he disclosed to his patent attorney as a filler which could be employed in his new resin compositions.

Dr. Kropa acknowledged as essentially satisfactory a definition quoted from The Technology of Plastics and Resins, by Mason and Manning, published by D. Van Nostrand Co. in 1945, as follows:

> Filler: 35-50 per cent. Materials * * added for the purpose of extending the resin and then modifying the properties of the finished product.

He indicated, however, that the limits would be within the 50% region (% of filler in the composition).

As to the proportion of abrasive grain to resinous material in an abrasive prod-

uct, Dr. Kropa's testimony included the following:

XQ 180. Do you know of any abrasive product in which you have, we will say, 30 per cent of abrasive grain, bonded by 70 per cent resinous material?

A. Not in that ratio, no. I believe the abrasive would be considerably higher.

XQ 181. That is the amount of abrasive would be considerably in excess of say, 30 per cent?

A. Seventy of abrasive and thirty of filler would be within shouting distance of it.

It thus appears from the record that the production of an abrasive article by the bonding of abrasive grains with a resin requires as a general rule that the article be comprised of abrasive grains and resin in the proportion of at least 70% abrasive grain and 30% resinous material, whereas the addition of a substance into a resinous composition as a filler is customarily accomplished at the relationship wherein the filler substance is 50% or less of the resin composition. It seems indisputable, therefore, that a resin artisan practicing the suggestion of the appellant's 1938 applications of adding "carborundum" or sand to the resins there disclosed in the proportions customary and appropriate for fillers would not inevitably or necessarily produce an abrasive article as that term is commonly known and understood in the abrasives industry. The disparity between the well known percentage of material to be added to the resin as a filler and that to be added for an abrasive article is too great to admit of the conclusion that an artisan practicing the former would inevitably secure the latter.

[7] Appellant's reliance on the doctrine of inherency to transmute his 1938 disclosure into support for the counts at bar is thus a misplaced reliance. Inherency does not mean that a thing might happen one out of twenty times. The fact that it might yield an abrasive article is not enough. It must inevitably happen for the doctrine to apply. Giambalvo v. Detrick et al., 35 C.C.P.A. (Patents) 1112, 168 F.2d 116, 77 USPQ 582; In re Draeger et al., 32 C.C.P.A. (Patents) 1217, 150 F.2d 572, 66 USPQ 247; Hansgirg v. Kemmer, 26 C.C.P.A. (Patents) 937, 102 F.2d 212, 40 USPQ 665.

We conclude, therefore, that appellant's 1938 disclosure does not meet the limitation of the counts, nor will compliance with the suggestion pertaining to the use of "carborundum", sand, etc. as fillers appearing in his voluminous 1938 applications inherently yield an abrasive article. The board was correct in refusing to award appellant his 1938 filing date for a constructive reduction to practice of the subject matter of the counts here in issue. The board's award of priority of invention to appellees must stand, and the decision appealed from is affirmed.

APPENDIX

A. Ex parte cases in which preamble held not to express limitation in claim.

No.	Case	CCPA (Patents) Vol.	Page	F.2d Vol.	Page	USPQ Vol.	Page	Introductory Clause
1.	In re Dawe	19	728	53	543	11	181	A driving wheel for tractors and similar agricultural implements
2.	In re Abrahamsen	19	1056	56	871	13	96	A moulding scraper
3.	In re Weingartner	19	1202	58	442	13	199	A stoker-drive power box
4.	In re Garratt	20	878	63	113	16	369	In a device of the class described
5.	In re Wolfe*	21	974	69	550	21	105	In a refrigerator cabinet
6.	In re Schoenky	21	1052	69	982	21	236	In a shoe-conveying system
7.	In re Beplate et al.	22	1232	77	506	25	386	In a carrying apparatus for use in the drying of a plurality of rows of filaments in skein form
8.	In re Allen **	24	1066	88	705	33	160	A cutting tool for high speed rotary cutting of non-metallic materials

* semble.

** While the introductory clause may have been considered a limitation, it was not a patentable limitation.

No.	Case	CCPA (Patents) Vol.	CCPA (Patents) Page	F.2d Vol.	F.2d Page	USPQ Vol.	USPQ Page	Introductory Clause
9.	In re Mason	25	873	94	220	36	337	In separating apparatus for separating the silicious and phosphatic constituents of oiled fine mineral phosphates
10.	In re Walker et al.	26	739	99	976	39	485	A blowpipe nozzle for removing surface metal from ferrous metal bodies by reaction with an oxidizing gas stream applied to the surface thereof
11.	In re Crabbs *	25	1214	97	349	37	740	In an asbestos cement shingle
12.	In re Waldron	28	862	117	381	48	381	A rock splitting tool
13.	In re Jannell	28	1262	120	1012	50	51	Apparatus for the manufacture of thread or the like in which the thread or the like is at all times accessible from a working face defined as a vertical plane paralleling the longitudinal axis of the apparatus as a whole
14.	In re Stacy	30	972	135	232*	57	307	In a fluid operated motor for drawing metal blanks where if the resistance of the blank to the drawing operation suddenly lessens during the drawing operation, the ram element may jump ahead
15.	In re Thuau	30	979	135	344	57	324	A new therapeutic product for treatment of diseased tissue
16.	In re Lamb	32	799	146	277	64	241	In a scaffold of the character described
17.	In re Jacobson et al.	32	970	148	1011	65	425	Apparatus for selective testing of combustible gases with different ignition temperatures including
18.	In re Rockwell	32	1177	150	560	66	215	A power unit for intensifying and modulating hydraulic pressure * * * said power unit comprising
19.	In re Hutchison	33	879	154	135	69	138	As an article of manufacture, adapted for use in the fabrication of a metal template or the like suitable for metal-working operations
20.	In re Dense	33	1171	156	76	70	212	A floor mat
21.	In re Benner et al.	36	1081	174	938	82	49	A ball mill lining element

* semble.

No.	Case	CCPA (Patents) Vol.	Page	F.2d Vol.	Page	USPQ Vol.	Page	Introductory Clause
22.	In re Hooker	36	1164	175	558	82	190	In photo-electric target apparatus
23.	In re Hansen et al.	37	1169	183	92	86	390	In apparatus for measuring high frequency power The method of measuring high frequency power by means of a bridge circuit having one element variable in resistance in accordance with excitation thereof

In the foregoing cases (A-1 through 23) the following were the principal reasons advanced for not considering the introductory clause to be a limitation in the claim:

In combination claims the invention must be found in the combination of elements making up the device. An introductory phrase is merely the title of the invention defined in the part of the claim following that clause. (Case A-1).

The introductory clause merely indicated a field of use different than the field of use of prior art devices, but the structure defined in the body of the claims following the introductory clause pertains to the same art as the prior art devices and is not inventive over that art. While the field of use of the respective devices differs, the art is the same. (Case A-3).

Where the structure is completely defined independently of the preamble of the claim and can be constructed from the description given, the preamble does not constitute a limitation upon structure but merely states a purpose or intended use of the structure. (Case A-7).

The introductory clause merely recites a property inherent in the old composition defined by the remaining part of the claim. (Case A-15).

In a process claim, where every physical step is anticipated by a reference, the introductory clause stating the purpose of the process is not a limitation, as it is immaterial what purpose the patentee had in mind. (Case A-23).

B. Ex parte cases in which the preamble either expressly or by necessary implication was considered to be a limitation upon the subject matter defined by the claim.

No.	Case	CCPA (Patents) Vol.	Page	F.2d Vol.	Page	USPQ Vol.	Page	Introductory Clause
24.	In re Fawick *	19	1124	56	873	13	92	In a transmission In an automobile vehicle having a spring supported frame
25.	In re Covey *	20	962	63	982	17	240	In a tire
26.	In re Bennett	20	1087	65	144	17	485	A sheet steel barrel construction for barrels formed of heavy gauge sheet steel and adapted for shipment of heavy contents weighing in the hundreds of pounds
27.	In re Buttolph	22	802	73	936	24	85	A discharge tube for positive column light
28.	In re Reichel	23	1293	84	221	30	74	An expansible diaphragm device
29.	In re Krasnow *	33	764, 768 -9	152	969	68	210, 212 -213	In an apparatus for measuring radioactivity within a borehole

* semble.

In the foregoing cases (B-24 through B-29) the following were the principal reasons advanced for considering the introductory clause a limitation in the claim:

The applicant was the first to provide the article described in the introductory clause comprised of the elements recited in the remainder of the claim (Case B-24) the existence of which latter, while previously known was not obviously useful in the environment specified in the introductory clause, and which use solved a problem, the solution of which had been sought for years by the industry (Case B-25).

Where there inhered in the article specified in the introductory clause a problem whose solution transcended that before prior artisans, the nature of that problem characterizes the elements comprising the article, recited in the body of the claim following the introductory clause, and distinguishes the claim over the prior art. (Case B-26).

The introductory clause constituted an essential element in the novelty of the device and constitutes a limitation in the claim (Case B-27).

C. Interference cases in which introductory clauses were held not to express a limitation in the counts.

No.	Case	CCPA (Patents) Vol.	Page	F.2d Vol.	Page	USPQ Vol.	Page	Introductory Clause
30.	Braren v. Horner	18	971	47	358	8	455	In an engraving machine and the like
31.	Deutsch et al. v. Ball	22	1322	77	930	25	470	A collapsible top for vehicle bodies of the cabriolet or convertible coupe type
32.	Marden et al. v. Braselton	28	1077	119	174	49	256	An ultraviolet lamp
33.	Bartsch v. Baker	30	919	134	487	57	143	A dish for maintaining food at a desired temperature

In the foregoing cases (C-30 through C-33) the following were the principal reasons advanced for considering the introductory clause not to be a limitation in the count:

The structure recited in the count following the introductory clause was a self-contained description and did not depend for completeness upon the introductory clause. That clause merely stated the particular use to be made of an otherwise integral apparatus or mechanism (Case C-30).

The structure defined in the counts exclusive of the preamble was a complete and definite invention irrespective of the intended use recited in the preamble (Case C-31).

D. Interference cases in which introductory clauses were expressly or impliedly held to express a limitation in the counts.

No.	Case	CCPA (Patents) Vol.	Page	F.2d Vol.	Page	USPQ Vol.	Page	Introductory Clause
34.	Hall v. Shimadzu	19	1288	59	225	13	259	A process of manufacturing a fine powder of lead suboxide intermingled with powder of metallic lead
35.	Smith v. Bousquet	27	1136, 1144	111	157	45	347, 352	An insecticide An insecticide composition
36.	Kenyon v. Crane	28	1208	120	380	49	707	A directional indicator for aircraft showing the direction and amount of deviation from course
37.	Lawson v. Davis	29	1217	129	873	54	405	In an article of hosiery A knitted article of apparel

In the foregoing cases (D-34 through D-37) the following were the principal reasons advanced for considering the introductory clause a limitation in the counts:

The introductory phrase is absolutely essential to point out the invention defined by the counts. The introductory phrase is necessary to give life, meaning, and vitality to the counts. Also, the counts originated in one party's patent where the entire object of the patent was expressed in the introductory clause of the counts, which objective nowhere appears in his opponent's disclosure. (Case D-34)

The preamble is a limitation where it specifies an article or composition in which there inheres a field of specific use, and the constituents of the article which are recited in the portion of the count following the preamble are old compounds not theretofore known to be useful in such an article. (D-35).

The preamble is an essential element of the invention defined by the counts and not merely introductory for the purpose of explaining the environment in which the other structural elements of the count are designed to be used. Moreover where a vital term of a count is susceptible of more than one interpretation, the meaning must be taken from the application in which the counts originated. (Case D-36).

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38 C.C.P.A. (Patents) 854

Court of Customs and Patent Appeals

In re GREIDER AND SMITH

Appl. No. 5746 Decided Feb. 6, 1951

PATENTS

1. **Appeals to Court of Customs and Patent Appeals—Issues to be determined—Ex parte patent cases**

Claims rejected as being directed to non-enumerated species are not before court on merits.

2. **Appeals to Court of Customs and Patent Appeals—In general**

Claims—Broad or narrow—In general

Pleading and practice in Patent Office

Rejection of Markush claims on ground that true generic claims appear in application is affirmed, even though subsequent change in Patent Office practice would make claims allowable, since Board's decision is reversed as to rejection on prior art, so application will be within Patent Office's jurisdiction, and it is reasonable that rejection as to Markush type should be withdrawn by Office.

Particular patents—Asbestos Material

Greider and Smith, Asbestos Sheet Material and Method of Manufacture, claims 1, 2, 4, 6 to 9, 11 to 13, and 22 of application allowed; claims 3, 5, and 10 refused.

Appeal from Board of Appeals of the Patent Office.

Application for patent of Harold W. Greider and Marion F. Smith, Serial No. 570,478, filed Dec. 29, 1944; Patent Office Division 38. From decision rejecting claims 1 to 13 and 22 to 24, applicants appeal. Affirmed as to claims 3, 5, and 10; reversed as to remaining claims; O'Connell, Judge, dissenting in part with opinion.

KENYON & KENYON, New York, N. Y. (LEE B. KEMON, Washington, D. C., and RICHARD K. PARSELL, New York, N. Y., of counsel) for appellants.

E. L. REYNOLDS (J. SCHIMMEL of counsel) for Commissioner of Patents.

JACKSON, Judge.

This is an appeal from a decision of the Board of Appeals of the United States Patent Office affirming that of the Primary Examiner rejecting, as unpatentable, claims 1-13, inclusive, and 22-24, inclusive, of a patent application, serial No. 570,478, filed December 29, 1944. No claims were allowed.

All of the claims were rejected by the Primary Examiner as unpatentable over a patent to Kennedy, No. 1,820,538, dated August 25, 1931, upon an application filed June 2, 1928, in view of a British patent, No. 440,409, dated December 30, 1935.

Claims 3, 5, and 10 are of the Markush type. They were further rejected by the examiner on the authority of In re Thompson, 33 C.C.P.A. (Patents) 942, 154 F.2d 189, 69 USPQ 148, true generic claims, such as claim 1, appearing in the application.

[1] An additional rejection was made of claims 23 and 24 as being directed to a non-enumerated species, and therefore, they are not before us on their merits.

Claim 1, being the broadest of the involved claims, is considered illustrative